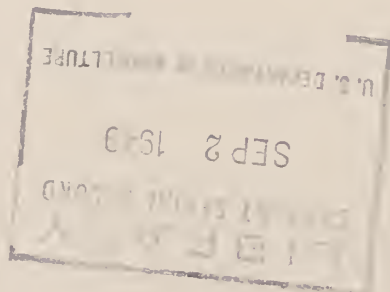


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COTTON TODAY AND TOMORROW THROUGH TECHNICAL RESEARCH
ON FIBER UTILIZATION 1,2/

AIC-245

July 21, 1949

by Walter M. Scott, Director
Southern Regional Research Laboratory 3/
New Orleans, Louisiana

Any scientist, if he can possibly get away from his laboratory, would welcome the kind of invitation which has been extended to me -- to talk about research to a group who from the beginning have given every evidence of their interest in research.

The Cotton Research Congress has gone on record as an active sponsor of research aimed at improving cotton's competitive market position. Some of you individually are helping to shape the course of that research by serving on the advisory committees set up to advise and aid the Department of Agriculture in planning and executing its expanded investigations under the Research and Marketing Act. As Director of the Southern Regional Research Laboratory, I have frequent occasion to put some of your recommendations to work -- start them through the scientific mill, I might say. Therefore, I consider it an obligation, as well as a very great pleasure, to report to you on the progress of some of the studies in which we have a mutual interest. In particular, I shall discuss some of the projects at present under way, and new research that is planned, on cotton fiber utilization.

With this subject of fiber utilization a hundred years ago, I would have monopolized your cotton utilization program, for in those days cotton was valued for its fiber alone. I shall have no such distinction today, because the cotton plant is now two crops -- lint and seed. Nevertheless, the present and future positions of cotton in the agriculture and industry of America depend greatly upon its continued success as a fiber.

I say continued success because we know that more cotton is used in the United States today than all other fibers put together. Synthetics are competing heavily, however, and all of us who are concerned about cotton's future are looking for ways to increase its attractiveness in the threatened uses.

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- 1/ Report of a study in which certain phases were carried on under the Research and Marketing Act of 1946.
 - 2/ Presented at the Tenth Annual Cotton Research Congress, Dallas, Texas, July 28, 1949.
 - 3/ One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

First, however, we must recognize the threat from synthetic fibers for what it really is. It comes not so much from the fibers themselves as from the tremendous research efforts and the amount of money being dedicated to their creation and improvement. If we fail to provide an equal amount of research for cotton, we cannot complain at the loss of its markets. Few mills or manufacturers are so faithful to cotton that they will exclude other fibers which prove more profitable. The textile man owes no particular allegiance to cotton. He is free to choose the fiber he finds most suitable from the standpoint of cost, processing behavior, and performance in the finished product. It is up to us, who do owe allegiance to cotton, to give it qualities that will make it the choice of the textile man and the ultimate consumer.

We have a better opportunity to do this today than we have ever had before. The Research and Marketing Act of 1946 marked the beginning of a new era in research on agricultural products. At the Southern Laboratory, for example, the additional funds provided for cotton research under this Act enabled us to initiate investigations on a number of problems that we could not otherwise have touched.

Most of you have an overall idea of the research that is at present being financed with funds provided under the Research and Marketing Act. You heard Dr. Leonard Smith, Technical Director of the National Cotton Council, outline the projects that had been approved at the time of your meeting last year. On fiber utilization, these included six projects relating to the fundamental characteristics of cotton, and five to the development of new and improved products from cotton through processing and chemical treatment. These were projects which had been undertaken at the Southern Laboratory in New Orleans. Six more projects, supervised by the Southern Laboratory, were under contract to other research agencies. The Bureau of Human Nutrition and Home Economics has undertaken studies relating to the utilization of cotton textiles for clothing and in the home. In other words, when you met last year, research on about 20 phases of cotton fiber utilization was being conducted under the Research and Marketing Act.

The Cotton Advisory Committee has recommended continuance of all these projects during the next two fiscal years. In addition, the Committee has recommended an equal number of new proposed areas of work, representing additional research that is greatly needed to improve cotton's competitive position in fiber utilization.

How many of these new proposals can be undertaken depends, of course, on the funds provided for their execution. I believe that progress will be speeded, if it is possible to carry out the full program outlined by the Cotton Advisory Committee.

Some of the proposed work is directly related to the investigations already under way and, if undertaken, will add much to the sum total of knowledge needed to enhance cotton's position in several specific end-uses.

Fashion Fabrics

One such end-use is fashion fabrics -- a fairly new but rapidly growing field for cotton. In this category several greatly needed projects are under way, and others have been proposed. Fashion experts are proceeding with the development of new styles in cotton just as fast as we can give them suitable fabrics -- fabrics that are flawless from the standpoint of appearance and behavior.

One defect which has been found at times in cotton fabrics is the presence of neps, the little tangled knots of fibers which prevent a smooth evenly colored surface. Very little is known as to why neps form, but the microscope shows them to consist mainly of thin walled (or immature) fibers, and fibers with small perimeters. It is known, however, that neps form during the mechanical manipulation of the cotton fibers preparatory to spinning. As reported to you last year by Dr. Smith, an investigation is in progress under a contract with the University of North Carolina to determine the exact cause and to find a remedy. Already, a device has been developed which greatly facilitates the counting of neps, and experimental processing of cotton is under way to determine whether modifications in the opening, cleaning, and carding operations will eliminate or reduce nep formation.

Some other qualities which handicap cotton from the standpoint of appearance are its susceptibility to wrinkling, its comparative deficiency in natural luster, and its limitations in draping qualities. A contract already has been approved for research to determine the influence of fiber properties and of yarn and fabric structure on the draping quality of cotton. Proposed projects to increase the resistance of cotton fabrics to wrinkling and to give added luster have received high priority ratings from the Cotton Advisory Committee. These projects call for systematic efforts to determine what kind of finish is needed to give cotton a silk-like sheen and which combinations of resin treatment and yarn and fabric construction give the best resistance to creasing or wrinkling. Several concerns this year marketed crush resistant summer wear made from resin treated cotton. Added research to develop improved treatments is important to cotton in this field of use.

The Institute of Textile Technology at Charlottesville, Va., has been investigating another property which is important if cotton is to achieve its rightful place in the fashion world, as well as in many other uses. In this research, performed under contract, it is planned to determine the factors which enter into soiling as a basis for the development of treatments to retard the soiling of cotton. It is anticipated that if a marked improvement in this respect can be obtained, cotton's opportunity for expanded utilization will be greatly enhanced.

Bags

Another threatened end-use of cotton on which research in addition to that already under way has been recommended and is greatly needed in order to protect the existing market, is bags.

During the past year the suitability of cotton bags for flour was considerably enhanced when the Southern Laboratory and the Laboratory of the Bureau of Entomology and Plant Quarantine at Manhattan, Kansas, working together, found a chemical treatment which successfully keeps insects from entering the bags but does not harm human beings. The treatment consists of pyrethrin, or a mixture of pyrethrin and piperonyl butoxide -- two non-toxic chemicals whose use is permitted in food processing plants at the present time. Cotton bagging can be impregnated with these chemicals without changing its appearance, and the slight odor is pleasing rather than objectionable. Baking tests indicate that the quality of flour stored in the treated bags is not affected.

Members of the Textile Bag Manufacturers' Association are now conducting large-scale tests to determine the practical value of this treatment for commercial use.

Other improvements are needed, however, to give cotton bags a greater edge over paper in the overall bag market. Paper bags today have one peculiar advantage in that they can be automatically filled at considerably lower cost than can cotton bags. High-speed packaging machinery designed especially to handle paper bags, but not adaptable to cotton bags, is the reason. Machinery of this type represents an appreciable investment, and companies which have installed it cannot afford to change from paper to cotton bags unless the cotton bags can be packaged on the same equipment. Obviously, a cotton bag which can be handled satisfactorily on high-speed paper packaging machinery would contribute greatly to the re-substitution of cotton bags for paper bags. Research on the adaptation of cotton bags to use in paper packaging machinery has been recommended by the Cotton Advisory Committee.

Cotton for Specialized Uses

During recent years we have come to realize more and more that the future of cotton depends to a large extent upon its ability to fill specialized needs. For many such uses, cotton already has numerous natural advantages. For others, it needs modification.

For example, many cotton products require more resistance to the penetration of water than cotton normally has. The knowledge that cotton's water resistance is increased by the natural swelling of the fibers when they are wet has led to the belief that this property might be useful in developing better raincoats, tents, tarpaulins, and other products which get wet in the normal course of use.

In order to determine what, if any, kind of cotton would be most suitable for such uses, by virtue of greater swelling capacity, microscopical measurements on cross sections of fibers from a number of different cottons have been made. These measurements show that cotton swells in water about 30 percent, with no significant difference in the swelling of mature (or fully developed) fibers and immature (or underdeveloped) fibers.

However, even with the same amount of swelling by individual fibers, the closing capacity of fabrics made with cotton of a low maturity is superior to that of fabrics made with normally mature cotton. This is because a given weight of immature cotton contains two to three times as many fibers as a like weight of mature cotton, and the fiber interspaces are finer. In other words, the 30 percent swelling is sufficient to close the small spaces between the tightly packed immature fibers but is ineffective in the larger spaces between mature fibers. The water resistance of fabrics woven from either mature or immature cottons in the Southern Laboratory's experimental textile unit has been further improved by increasing the number of filling threads 20 to 30 percent above normal through the use of a newly-developed loom attachment. In this way, the leakage of water was reduced to a small fraction of the amount through normal fabrics -- in some cases, to none at all.

Another highly specialized use for cotton is in the warp yarn of carpets, which must be sufficiently strong and dimensionally stable and at the same time must meet the price competition of rayon. Possibilities for improving cotton for this use are being explored under a contract project with the Lowell Textile Institute at Lowell, Massachusetts.

Work has been proposed for the investigation of methods of improving several other specialized industrial uses of cotton, such as cord for use in rubber transmission and conveyor belts, clotheslines, and similar products. This work will be undertaken as funds permit.

Improved Testing Methods

Because they are important to an understanding and evaluation of the basic qualities of cotton, I should like to mention briefly two other contract projects which are now under way. One of these is concerned with the development of an improved machine for rapidly and accurately determining the tensile strength of cotton fibers by the University of Tennessee, at Knoxville. The other, with the National Bureau of Standards in Washington, is concerned with a method for determining the infra-red absorption or reflection characteristics of cotton cellulose. Such a method will be extremely valuable in studies of the effect on cotton of various degrading influences, such as light, heat, or air oxidation.

Family Utilization Studied

So far I have spoken mostly about existing research conducted or supervised by the Southern Regional Research Laboratory. I should now like to call your attention to two projects of the Bureau of Human Nutrition and Home Economics which are providing some valuable information to guide our efforts to increase the utilization of cotton fiber.

One of these projects is aimed at obtaining facts on how cotton fabrics of known composition and construction meet the needs of families, that is, how long different types of fabrics will wear under conditions of actual use, how they will launder, how they will withstand abrasion or rubbing, and how much they shrink or stretch when washed or dry cleaned.

The other project seeks information on the present and potential utilization of cotton and other clothing through studies of inventories held by families, annual purchases, prices paid, and factors affecting family practices in regard to cotton clothing and household articles. Such information of this nature will be useful to manufacturers, merchants, and to others concerned with the production and sale of cotton goods.

Pioneering Studies at the Southern Laboratory

In the brief time left at my disposal, I will mention some of the research that is conducted at the Southern Laboratory under regular funds -- work that was already well advanced when the Research and Marketing Act was passed and which is now attracting the widespread interest of industry. Some of you know about our success in prolonging the life of cotton fabrics used as tobacco shade cloth by applying a special treatment of mineral pigments. The cloth protected by a lead chromate treatment lost only 25 percent of its strength whereas the untreated cloth suffered 70 percent loss. This means that the treated cloth can be used at least one more season than the treated cloth. You have probably also heard about the rotproofing treatment known as partial acetylation, which makes cotton more serviceable for many uses such as fish nets, water-softening bags, sand bags, and other products subject to mildew exposure. This treatment also improves the resistance of cotton fabrics to heat and it has been shown to double or even triple the life of cotton ironing pads in a commercial laundry.

The differential dye test for determining cotton maturity, which won a superior service award for one of our employees this year, is widely used by industry as a guide to the channeling of cottons of different maturities into the end products for which they are best suited.

Chemical modifications have been found which impart to cotton certain desirable dyeing characteristics; which increase the rapidity with which it can absorb water; and which improve cotton's physical qualities in several other ways.

Cotton mechanical processing investigations have resulted in the development of improved equipment for opening cotton prior to manufacturing and the development of other equipment for use at several stages of the spinning and weaving processes.

In addition, much fundamental data has been obtained on the relation of fiber properties to the performance of finished products.

The full significance of these findings cannot be realized without taking into account their influence on the present research program. Besides their important contributions to a more efficient cotton utilization program during and since the war, they have revealed many blank spots in our knowledge, which must be filled before cotton's usefulness can be more fully exploited. They are the reservoir of knowledge upon which the present enlarged program of research is being erected.

Conclusion

This new program of research is undoubtedly the key to cotton's future economic security. Your Congress can be truly proud of its part in stimulating interest, and in planning and guiding such a program. Furthermore, you can claim a share in its execution. For your enthusiasm and encouragement definitely are reflected in the efforts of the scientists who foretell the future of cotton in their laboratories. Too much emphasis cannot be placed upon your role in stimulating the technical research upon which cotton is to rely for dominance in tomorrow's textile world.

